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(2)

(54) CUTTING HEAD

(71) We, PLANTERS POWERGRIND LIMITED, a British Company of 500, London Road, High Wycombe, Buckinghamshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The object of this invention is to provide an improved cutting head in or for a glass cutting machine whereby a better scoring or scribing action is obtained in cutting sheet glass. Practical advantages in this respect will be apparent from the following disclosure.

According to this invention a cutting head in or for a sheet glass cutting machine is characterised by a carrier body which is adapted to be traversed in the machine relative to a bed of the latter for supporting a sheet of glass to be cut; a shaft carried for axial sliding movement by the carrier body, which shaft has directly mounted on one end thereof a cutting tool holder rotatably carrying alongside it a follower wheel for contact with the surface of a said sheet of glass, and spring loading means acting between the carrier body and the shaft in order to yieldably urge a cutting tool carried by the holder and the follower wheel against the glass whereby scoring of the surface thereof to a uniform depth is obtainable despite some irregularity which may occur in the distance between the carrier body and the surface of the glass e.g. due to variation in flatness of the surface.

In practical embodiments of the invention the constructions and arrangements are as follows, reference being had to the accompanying drawings in which:—

FIGURE 1 is a side elevation of one form of cutting head incorporating the invention, FIGURE 2 is an end view in the direction of the arrow II of FIGURE 1,

FIGURE 3 is a side elevation of another form of the cutting head, and

FIGURE 4 is an end view in the direction of the arrow IV of FIGURE 3.

Like parts are designated by the same or

similar reference numerals throughout the drawings.

Referring to FIGURE 1 the head 1 comprises a carrier body in the form of a block 10 which is adapted to be clamped at 11 to a transverse support bar 12 of a cutting machine whereby the head 1 can be traversed over the surface 2 of a sheet of glass to be scored and at a required distance above the latter. Normally, and as shown, the sheet of glass at 2 lies in a horizontal position on the machine bed but it may be otherwise positioned with corresponding positioning and traverse of the head 1 whilst, if desired, traverse of the glass sheet at 2 relative to the head 1 may be effected.

Whereas the block 10 is shown screw clamped at 11 to the bar 12 it may be otherwise clamped on such as by an air operated clamp for obtaining rapid setting of the block 10 and firm mounting.

The block 10 slidably receives a vertical shaft 3 i.e. perpendicular to the surface 2 of the glass, the lower end of the shaft 3 directly carrying aligned therewith a holder 4 for a cutting tool 5 which may consist of the usual cutting wheel of hard material such as steel or tungsten carbide or may consist of a diamond scribing point. The cutting tool 5 is adjustably mounted in the holder and is clamped in the required preset position by a screw 50. For accurate operation with a minimum of friction, the shaft 3 is preferably received by linear motion ball races 13 in the block 10.

The holder 4 rotatably carries about a transverse axis and alongside it a relatively large follower wheel 6, the periphery of which in use contacts the surface 2 of the glass whilst the holder 4 is pivoted about a transverse axis 40 to the lower end of the shaft 3 for one-way or knee action pivotal movement. Thus a cut-away or chamfered end part 41 of the swivel holder 4 permits movement of the holder 4 to the right in FIGURE 1 but the abutment of the flat 42 with the shaft 3 at 32 prevents pivotal movement of the holder 4 to a controlled position usually marginally beyond the ver-

tical in the opposite direction. The holder is spring urged to the upright position shown in FIGURE 1 by a tension spring 44 connected between pegs 43, 33 respectively carried by the holder 4 and lower end of the shaft 3. The lower end of the holder is also shown carrying a lubricating or oiling pad 8. A cross piece 30 at the upper end of the shaft 3 above the head block 10 is connected by an adjustment screw 31 to the upper end of a tension spring 9 parallel with the shaft, the lower end of the spring 9 being anchored to an adjustment screw 19 carried from the block 10 by a bracket 14. The adjustment screw is constrained against rotation such as by a lug 16 engaging a slot 17 in an upright member or plate 18 secured between the lower bracket 14 and an upper bracket 15 which guides the adjustable connecting screw 31, the latter carrying a sleeve 35 for the purpose. By such an arrangement the tension of the spring 9 can be accurately adjusted by rotation of the nut 20 and without turning or winding the spring 9.

As will be appreciated the spring 9 urges the shaft 3 and cutter holder 4 in a downward direction towards the surface 2 of the glass, downward movement of the shaft assembly being limited by an adjustable stop screw 34 carried by the cross piece 30 and which abuts the top of the block 10.

The operation of the cutting head is as follows:—

On an initial outward movement of the head 10 across the surface 2 of glass to be scored i.e. in a left hand direction in FIGURE 1, the knee action pivotal mounting at 40 of the holder 4 on the shaft 3 is such that it swings back to raise the cutting tool 5 and follower wheel 6 clear of the surface 2 of the glass, whilst on the other hand, the pad 8 is pressed against the surface 2 to apply oil along the required line of cut. The tool holder 4 is traversed beyond the far edge of the glass sheet where the holder assumes its substantially vertical position by the action of the spring 44.

On return traverse of the head 1 i.e. to the right in FIGURE 1 the follower wheel 6 easily rides over the edge of the glass and since the cutting tool 5 is preset to a lower depth than the lowermost periphery of the wheel 6, the cutting tool 5 is positioned for scoring engagement with the surface 2 of the glass. The follower wheel 6 thus effects depth control of the cutting tool 5 in relation to the surface 2 for obtaining a fine score line of uniform depth and regular quality. Furthermore the angle of incidence of the cutting tool 5 to the glass surface 2 remains constant.

At the same time and within practical limits any departure from the fixed distance between the head block 10 and the surface

2 of the glass is accommodated by the spring loaded action of the vertical shaft 3. Such departure may be due to variation in flatness of the glass surface 2 e.g. in the case of the reverse side of figured or cast glass and/or due to variation in the mechanism of the machine carrying the head 1 and/or in the bed or table of the machine carrying the glass sheet.

Owing to the small extent of such compensating movement of the shaft 3 the resilient or cutting pressure imparted to the cutting tool 5 by the spring 9 remains substantially constant, which pressure can be readily adjusted at 20 according to requirements.

As a result of the uniform scoring which is obtained, clean and square cut edges of the glass are obtained when the latter is subsequently snapped or broken along the path of the score line. Furthermore the depth control effected and yieldable action of the head 1 also results in a prolonged serviceable life of the cutting tool.

Referring to FIGURE 3 the construction and mode of operation is generally similar to that already described except that instead of connection to a tension spring, the cross piece 30 of the shaft 3 is acted upon by the piston rod 91 of a fluid pressure actuated cylinder 90 having a pneumatic or hydraulic action and carried by a bracket 95 from the block 10.

The piston rod 91 acts on the cross piece through the intermediary of a spring buffer 92 shown in the form of a compression spring acting between the upper side of the cross piece 30 and stop nut means 93 on the piston rod 91. However, the buffer 92 may consist of a rubber block or secondary pressure chamber or cylinder. The cylinder 90 enables cutting pressure to be applied to the cutting tool 5 to a required extent with the buffer 92 permitting suitably responsive resilient yielding movement of the shaft 3 in compensating for variations of the kind already referred to.

The arrangement is particularly advantageous in that the cylinder 90 can be remotely controlled in this way and likewise the cylinders of a number of cutting heads 1 for effecting required cutting tool operation or withdrawal especially where complex cutting patterns are involved and which may be controlled by numerical or other automatic control systems.

It will also be appreciated that a cutting head assembly according to this invention can be of simple, compact and robust form.

WHAT WE CLAIM IS:—

1. A cutting head in or for a sheet glass cutting machine characterised by a carrier body which is adapted to be traversed in the machine relative to a bed of the latter for

supporting a sheet of glass to be cut; a shaft carried for axial sliding movement by the carrier body, which shaft has directly mounted on one end thereof a cutting tool holder rotatably carrying alongside it a follower wheel for contact with the surface of a said sheet of glass, and spring loading means acting between the carrier body and the shaft in order to yieldably urge a cutting tool carried by the holder and the follower wheel against the glass whereby scoring of the surface thereof to a uniform depth is obtainable despite some irregularity which may occur in the distance between the carrier body and the surface of the glass e.g. due to variation in flatness of the surface.

2. A cutting head according to claim 1 wherein the cutting tool holder is aligned with the shaft.

3. A cutting head according to claim 1 or 2 wherein the cutting tool holder is pivotally mounted about a transverse axis on the said end of the shaft so as to have a knee action in relation to the shaft.

4. A cutting head according to claim 1, 2 or 3 wherein the shaft is slidably carried by linear motion ball race means on the carrier body.

5. A cutting head according to any of the preceding claims wherein the spring loading means acts between the other end of the shaft and the carrier body.

6. A cutting head according to any of the preceding claims wherein a crosspiece on the shaft is connected to, or acts upon, the spring loading means which is in turn connected to the carrier body and acts parallel with the shaft.

7. A cutting head according to any of the preceding claims wherein the spring

loading means is adjustable by screw means providing anchorage or abutment for the spring loading means.

8. A cutting head according to any of the preceding claims wherein adjustable stop means is provided acting between the shaft or a part carried thereby and the carrier body in order to adjustably limit the extent of spring loaded movement of the cutter holder and follower wheel in a direction towards the surface of glass to be cut.

9. A cutting head according to claim 7 or claims 7 and 8 wherein the spring loading is provided by tension spring means adjustably anchored to the carrier member by screw and nut means, that part of the screw and nut means connected to the tension spring means being constrained against rotation to prevent turning or winding of the tension spring means.

10. A cutting head according to claim 4 wherein actuating means is carried by the carrier member and acts on the spring loading means for applying cutting pressure via the latter to a cutting tool carried by the cutter holder.

11. A cutting head according to claim 10 wherein the actuating means consists of fluid pressure operated piston and cylinder means.

12. A cutting head in or for a sheet glass cutting machine substantially as herein described with reference to FIGURES 1 and 2 or to FIGURES 3 and 4 of the accompanying drawings.

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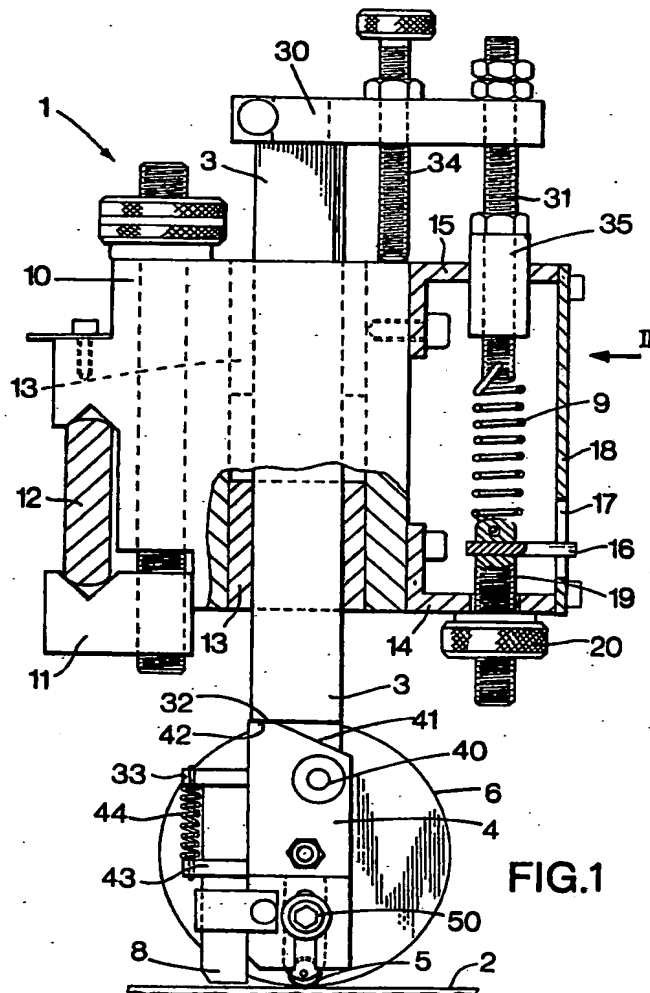
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COMPLETE SPECIFICATION

3 SHEETS

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Sheet 1

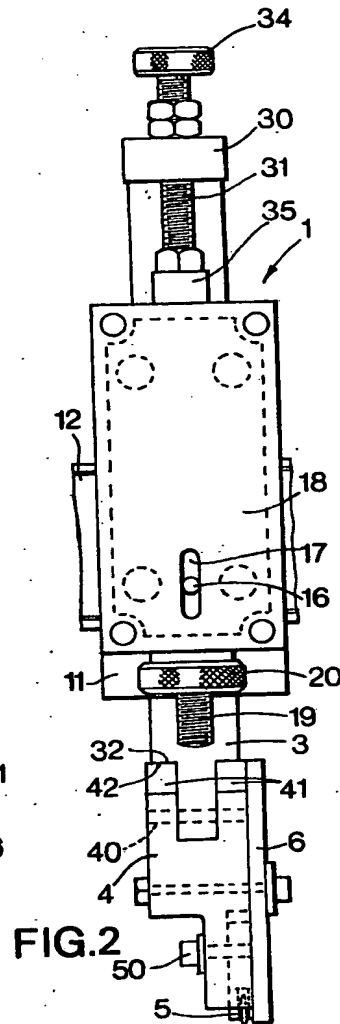
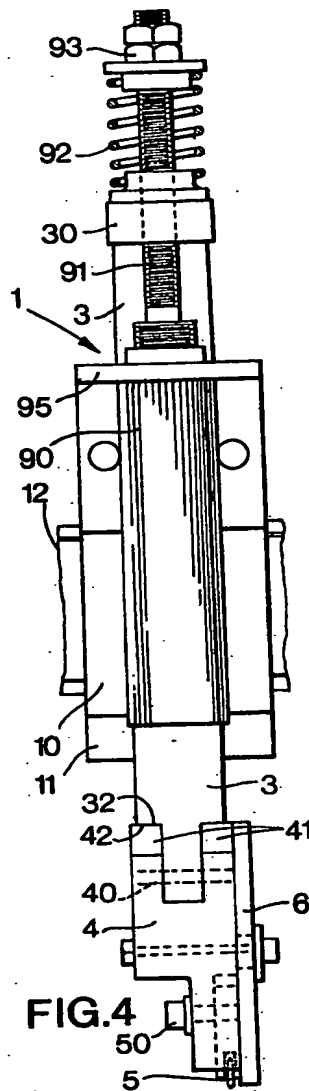


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COMPLETE SPECIFICATION

3 SHEETS

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Sheet 2



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COMPLETE SPECIFICATION

3 SHEETS

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